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(54) DEVICE FOR TREATMENT OF PATIENTS WITH DISTURBED POSTURE AND MOTOR ACTIVITY

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(14) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 08/646,213

(22) Filed: May 7, 1996

## Related U.S. Application Data

(63) Continuation of application No. 08/196,169, filed as application No. PCT/RU92/00247 on Dec. 18, 1992, now abandoned.

## (30) Foreign Application Priority Data

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(51) Int. Cl.<sup>7</sup> ..... A63B 21/02

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(58) Field of Search ..... 482/51, 121, 122, 482/124; 601/23, 33

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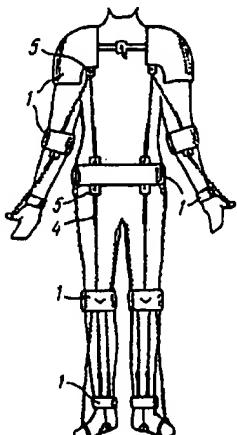
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## (57) ABSTRACT

A device for treatment of patients with disturbed posture and motor activity comprises shoulder, pelvic, knee, pedal, elbow, hand, and finger supports (1), all of them being interconnected by fixing elements, which are shaped as elastic tie-members (2) and placed on the surface of the patient's body in antagonistic pairs so as to follow anatomical arrangement of skeletal muscles. Each of the tie-members (2) is connected to two of the supports (1) and comprises an adjuster (3) of its tension, which is interposed between the tie-member (2) and one of the supports (1) through a lock (5).

17 Claims, 1 Drawing Sheet

EXHIBIT  
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US 6,213,922 B1

Page 2

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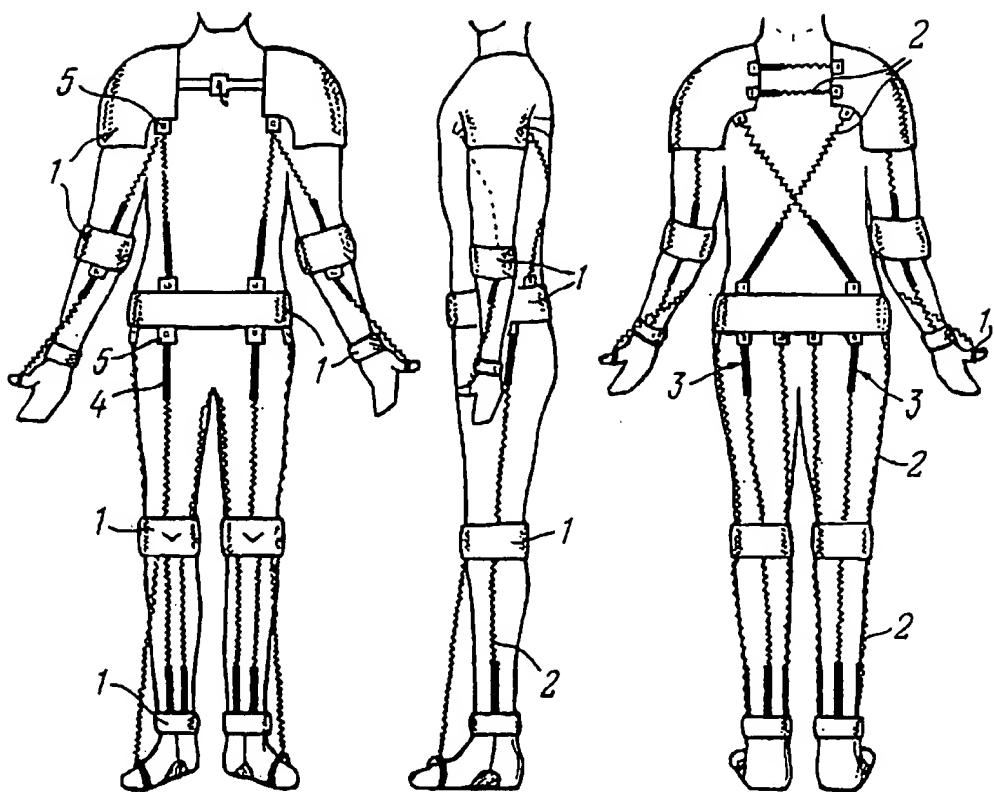
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U.S. Patent

Apr. 10, 2001

US 6,213,922 B1



*FIG. 1*

*FIG. 2*

*FIG. 3*

## US 6,213,922 B1

1

**DEVICE FOR TREATMENT OF PATIENTS WITH DISTURBED POSTURE AND MOTOR ACTIVITY**

This is a continuation of application Ser. No. 08/196,169 filed on Feb. 15, 1994, now abandoned, which is a 371 of International Application PCT/RU92/00247 filed on Dec. 18, 1992, and which designated the U.S.

**TECHNICAL FIELD**

The present invention relates generally to devices for nonsurgical (conservation) treatment of the locomotor apparatus (locomotorium) in various neuropathies, and more specifically to a device for treatment of patients with disturbed posture and motor activity.

The invention can find most utility when used for treatment of infantile cerebral paralysis.

The invention is likewise applicable in cerebrovascular accidents involving motor disturbances and traumatic lesions of the spinal cord.

Furthermore, the invention can be applied for correction of patient's posture (attitude), as well as for sports exercises.

**BACKGROUND ART**

At present the number of neuropathic patients suffering from affection of the locomotor functions becomes immense, while infantile cerebral paralysis, in particular, tends to rise, for a number of reasons, in many countries throughout the world.

Treatment of motor functions in infantile cerebral paralysis patients becomes urgent due to both, the number of patients and imperfection of the treatment method available.

The present state of the medical art knows a number of methods and devices for treatment of patients with disturbed posture and motor activity.

One state-of-the-art method for treatment of patients with disturbed posture and motor activity (cf. "Surgical correction of posture and walking in infantile cerebral paralysis" by A. M. Zhuravlev et al., 1986, Aiastan Publishers, Yerevan, pp. 90-91 (in Russian) is known to comprise stage-by-stage plastering, followed by rigidly fixing the position of the limb and trunk with an altered posture. A disadvantage inherent in said method resides in a restricted motor activity (immobility) of a patient, which might result in amyotrophy, spastic phenomena, and increased hypertensive syndrome due to enhanced pathological muscular synergies.

Furthermore, another disadvantage of said object is a prolonged treatment period, that is, from 4 to 6 months.

One state-of-the-art device for treatment of patients with disturbed posture and motor activity is known (FR, A, 2,120,500) to appear as overalls into which flexible inflatable tubes are inserted to impart rigidity thereto.

A disadvantage inherent in said device is the fact that it is aimed at maintaining the patient's body in a definite position, whereby the field of application of said device is extremely restricted. In addition, said device fails to solve the problem of muscular exercises of a patient, which might lead to profound dysfunction of the muscular system.

Another device for treatment of patients with disturbed posture and motor activity is known (FR, A, 2,252,836) to comprise two blades interposed between the patient's thighs, each of said blades being fixed to a respective thigh, and a mechanical system connected to the blades.

2

The device under discussion suffers from the disadvantage that it can correct only a wrong position of the thighs, knee joints, and feet. In addition, said device is bulky and therefore its application with therapeutic purposes is very questionable.

One more device for treatment of patients with disturbed posture and motor activity is known (SU, A, 1,528,483) to comprise a thoracic, pelvic, and pedal support, and fixing elements to interconnect the aforesaid supports to one another.

The fixing elements are shaped as telescopic stands interconnecting the pedal supports with the pelvic one and with a bar one of whose ends is rigidly coupled to the pelvic support. The bar carries a roller reciprocatingly mounted thereon and rigidly linked to the thoracic support. Two arms are rigidly connected to the pelvic support, the free ends of said arms being connected to springs movably mounted on the telescopic stands.

With the patient's body in the erect position the roller provides a light reclining effect produced on the entire vertebral column, while the thoracic support provides rest for the upper trunk portion. With an inclined position of the trunk the roller rides over the bar depending on the angle of inclination so as to assume an optimum position, and the springs impart an effort to the bar. Thus, the weight of the inclined trunk portion is compensated for and the muscular system and vertebral column are released from load.

A disadvantage of the abovesaid device consists in that it is intended for treatment of the vertebral column only by releasing it from load. In addition, use of said device might result in restricted mobility of a patient followed by amyotrophy and affected activity of the antigravity muscles. Above all the treatment process with the use of said device is too prolonged.

**DISCLOSURE OF THE INVENTION**

It is an essential object of the present invention to provide a physiologically normal stereotype of posture and movements.

The present invention has for its principal object to provide a device for treatment of patients with disturbed posture and motor activity, wherein the fixing elements interconnecting the supports have such a construction that enables the patient's trunk and limbs to be fixed in a position approximating normal physiological parameters, while maintaining a possibility of performing energy-loaded movements by the patient, with the amplitude of said movements characteristic of a given patient.

The foregoing object is accomplished due to the fact that in a device for treatment of patients with disturbed posture and motor activity, comprising pelvic and pedal supports placed on patient's trunk and limbs and interconnected by fixing elements, according to the invention, the fixing elements are shaped as elastic tie-members arranged on the patient's body surface so as to follow anatomical arrangement of the skeletal muscles, each of the tie-members being connected to two supports.

The proposed device is instrumental in fixation of joints in a required position and to establish a moment of force effecting flexion, extension, rotation, adduction, and abduction of the patient's limbs and trunk.

According to a preferred embodiment of the invention, the device comprises additional shoulder, knee, elbow, finger and toe supports.

Such an embodiment of the invention makes it possible to fix practically all the joints of patient's trunk and limbs in a

A new stereotype of control of patient's movements is established in the course of treatment. In addition, the patient's physiological status becomes predominant, which results in reduced amount of pathological muscular activity. Drugs and increased exertion of motor activity are allowed to correct the patient's posture in the cases unamenable to treatment with other corrective methods.

The tie-members 2 arranged on the surface of the patient's body in anteroposterior pairs to follow the anatomic drainage. The skin of the patient's back is moved in the direction of the drainage. As the patient becomes adapted to the increased degree of extension of the member, it can cause a great increase in the effectiveness of the drainage action on the device, the correction force is increased without increasing the pressure on the device.

Thus, a dynamic supporting structure (functional courses) is established with the aid of the present device (is stabilized with the aid of the present device and the pattern is prepared for performing movements). The device is utilized by the patient with due account of his/her stations and individual peculiarities daily for a period of up to 12 hours a day, a treatment cycle lasting for 15-30 days.

such as buckles used in safety belts.

Once member 2, while the elastic tie-members are extended, the means for releasing the lock 5 installed in one of said supports 1, in the lock 5 mounted on one of the band 4 is connected with the respective tie-member 2, while the respective end of the band 4 is secured to the elastic tie-members 2 and 3 so that the lock 5 is released. The lock 5 is then locked in its normal position by the elastic tie-members 2 and 3 connecting the respective ends of the band 4.

The proposed device is selected individually for every patient taking account of bis/beer stain and size of the body. Then the device is put onto the patient and those lie members 2 are tensioned which correct the position of the body parts to be treated. The i-cm-members 2 are adjusted in the direction of the patient's back until a new position of the trunk and limbs is adjusted until a new position of the trunk and limbs is established, which approximates the normal physiological condition of the body. The i-cm-members 2 are then tensioned to fixed by the locks 5. The i-cm-members 2 are tensioned with the aid of the adjuster. The i-cm-members 2 are adjusted for each device. This done, the device is ready for use.

Spacecally, the inc-members can be made of rubber, plastics, or appear as metallic springs.

life support.

load is not transferred to any other Ic-member company concerned to  
the extent of any such transfer.

As shown in Figs. 1, 2, and 3, the supports can substitute trially cover the joint to which they are mounted. For plastics, and so on.

surivable for performing a similar function.

**Supports L.**

It is held to a lock 5 which is tumed by fastened on one of the ends counteracted to the tie-ic-members 2 and the opposite end is held to a lock 5 which is fastened on one of the ends counteracted to the tie-ic-members 2 and the opposite end

support. I, whom you may be able to see at the  
convention, will be happy to have a talk with you about it.

Parties to follow the administrative arrangement of the skeletal muscles. Each of the ligaments stands in relation to 3 of its muscleles. Each of the ligaments stands in relation to 3 of its muscleles. Each of the ligaments stands in relation to 3 of its muscleles. Each of the ligaments stands in relation to 3 of its muscleles.

the member 2 are so connected to the supports 1 that they are arranged on the surface of the patient's body in an oblique

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The service to the community supports I adapt to  
for being involved in the nation's  
and I am able to make a difference.

THE 100 CHINNERS IN 1922 LIST  
INVENTION

Further objectives and advantages of the will be undertaken from the following aspects of a specific example already mentioned before parading through its various stages.

#### BRIEF DESCRIPTION OF THE DRAWINGS

### EXAMPLE 1

US 6,213,922 B1

7

14. The device of claim 7, wherein each of said supports that is positioned in the region of the patient's waist, in an operative configuration, is positioned to closely surround the patient's waist.

15. The device of claim 7, wherein each of said supports that is positioned in the region of the patient's hand, in an operative configuration, is positioned to closely surround the patient's hand.

16. A device for treatment of patients with disturbed posture and motor activity, said device comprising:

supports that, in an operative configuration, substantially cover the patient's shoulders, elbows, hands, fingers, waist, knees, and feet, each of said shoulder supports defining a cup-shaped shoulder harness;

a plurality of elastic tie-members that interconnect said supports, each tie-member from said plurality of tie-

10

15

8

members interconnecting two of said supports, and, in an operative configuration, said plurality of tie-members are placed on a body surface of the patient in antagonistic pairs with due account of an anatomical arrangement of the patient's skeletal muscles; and a plurality of adjusters interposed between the elastic tie-members and the respective supports, each adjuster from said plurality of adjusters including a band having a first end connected to the respective elastic tie-member and a second end held in a lock located on the respective support.

17. The device of claim 16, wherein said supports, in an operative configuration, closely surround the patient's shoulders, elbows, hands, fingers, waist, knees, and feet.

\* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
CERTIFICATE OF CORRECTION

PATENT NO. : 6,213,922 B1  
DATED : April 10, 2001  
INVENTOR(S) : Nikolai Afanasenko et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2.

Line 11, change "are" to -- as --.

Column 3.

Line 50, change "tie-member 2" to -- tie-members 2 --.

Signed and Sealed this

Fourteenth Day of May, 2002

*Attest:*



JAMES E. ROGAN

*Director of the United States Patent and Trademark Office*

*Attesting Officer*